2018 International Energy Conservation Code

Commercial Lighting Requirements

Lynn Chamberlin -- Lynn.Chamberlin@Nebraska.gov

Housekeeping

- All participants are muted.
- This event will be recorded and available on http://dee.ne.gov/
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- If you are having audio issues when connecting via computer, please call in via phone at: 1-415-655-0003 access code: 921 977 200
- Certificates will be available for those viewing the presentation live, not for those downloading after the presentation. They will be sent within the next week.

Questions

- Please feel free to submit questions in chat throughout the presentation. They will be answered during specified breaks during the presentation.
- We can stay on longer than the originally scheduled end time to answer questions.
- An FAQ document will be uploaded to the video events page.

Why Energy Codes?

- Energy Codes set minimum efficiency requirements for new and renovated buildings, assuring reductions in energy use and emissions over the life of the building. Energy Codes are a subset of building codes, which establish baseline requirements and govern building construction.
- Code buildings are more comfortable and cost-effective to operate, assuring energy, economic and environmental benefits.
- The relationship between the IBC and the IECC
  - IECC addresses only energy topics
  - IBC addresses all topics (structural, plumbing, etc.) in One book

- IECC addresses both residential and commercial construction; IBC addresses all of the subsets of commercial construction

Structure of the 2018 IECC

Commercial Section

Ch. 1 Scope and Application/ Administration and Enforcement

Ch. 2 Definitions

Ch. 3 General Requirements

Ch. 4 Commercial Energy Efficiency

Ch. 5 Existing Buildings

Ch. 6 Referenced Standards Index

- What are Commercial Buildings?
  - All buildings other than:
    - One- and two-family dwellings, townhouses of any size and R-2, R-3, R-4 ≤ 3 stories
    - All buildings that are not “residential” by definition; are “commercial”

Commercial Buildings Can Be Complicated!

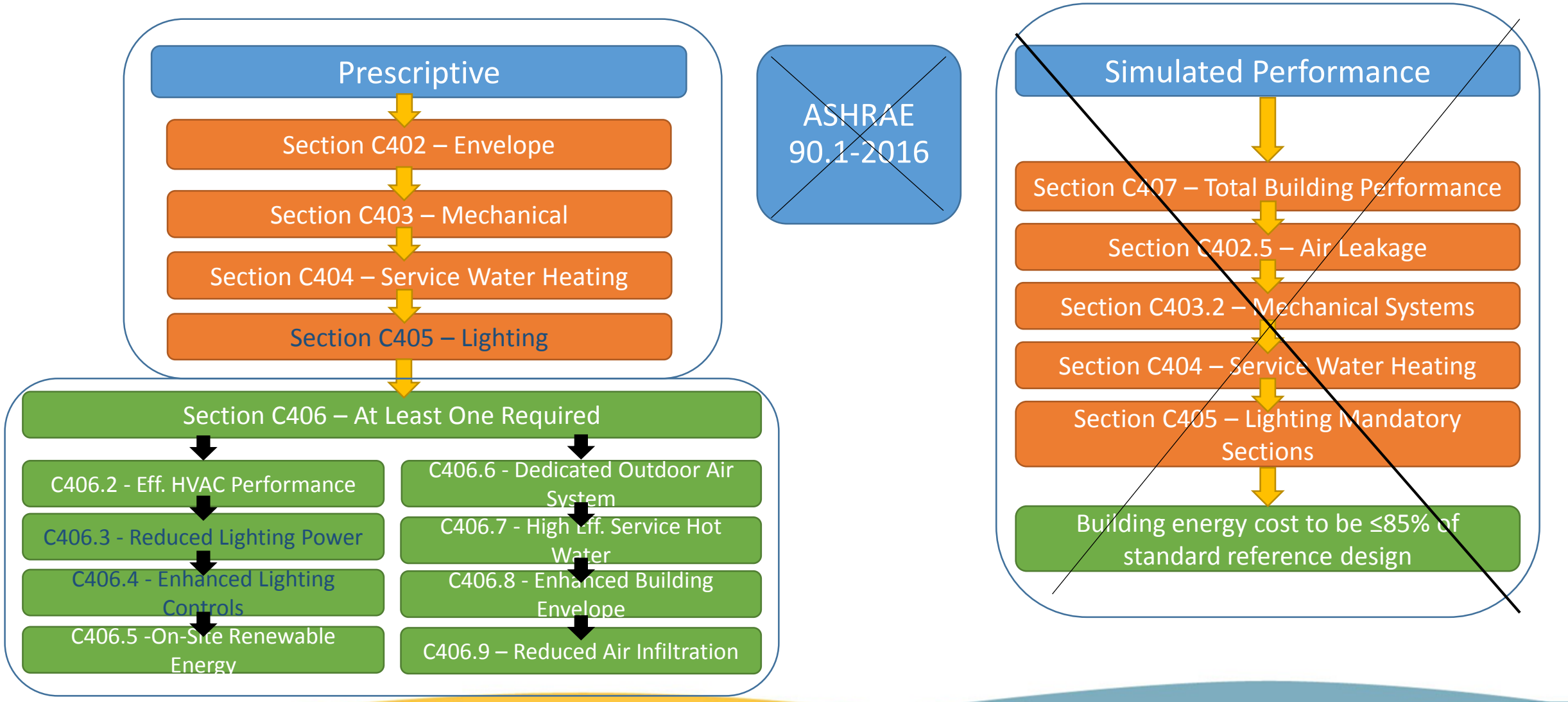
Mixed Use Buildings

- Treat the residential portion of the building under applicable residential code
- Treat the commercial portion of the building under applicable commercial code
- Code Official has the final authority regarding compliance materials, software, worksheets, compliance options

Exempt Buildings

- Buildings or portions of buildings that are separated from remainder of building by building thermal envelope assemblies complying with C402 **are exempt** from the Envelope provisions if:
  - Peak design rate of energy < 3.4 Btu/h/ft^2 or 1.0 watt/ft^2 of floor area for space conditioning purposes, **OR**
  - Those portions or building that do not contain conditioned space, **OR**
  - Greenhouses

IECC Commercial Compliance Paths/Options



When Lighting and Power Provisions Apply

- Original Installed Lighting System in a New Building, Addition, or Tenant Build-out
- Existing Lighting System that is Altered
- Change in Occupancy that Increases Energy
- Change in Occupancy that requires less LPD as shown in the LPD tables
- Based on Nebraska Statute -
  - If the cost of the work being completed is 50% or more of the replacement cost of the building
  - In state-owned, state-funded buildings

<u>Exceptions:</u>

- Historic buildings
  - State or National listing
  - Eligible to be listed
- Alterations where less than 10% of the luminaires in a space are replaced and installed interior power lighting is not increased
- Lighting within dwelling units
  - Where ≥ 75% of permanently installed fixtures (except low-voltage) are fitted for and include high-efficacy lamps
  - Walk-in coolers, walk-in freezers, refrigerated warehouse coolers, and refrigerated warehouse freezers comply with C403.2.15 or C403.2.16

Covered Under Lighting and Power Provisions

- Mandatory Interior Lighting Requirements
  - Required Controls
  - Wattage/Efficiency Limits
- Interior Lighting Power Allowances (watts/ft2)
- Exterior Lighting Controls
  - Required Controls
  - Lamp Efficiency
- Exterior Lighting Power Allowances (watts/ft2)
- Dwelling Electric Meters
- Electrical Transformers and Motors
- Vertical and Horizontal Transportation Systems and Equipment

Exception:

- Residential dwelling units in commercial buildings that have a minimum of 75 percent of high efficacy lighting
- Low-voltage lighting

Definition of High Efficiency Lighting

Compact fluorescent lamps, LED lamps, T8 or smaller diameter linear fluorescent lamps, or other lamps with an efficacy based on lamp wattage

Lamp Wattage	Efficacy
> 40 watts	60 lumens/watt
15-40 watts	50 lumens/watt
< 15 watts	40 lumens/watt

Interior Lighting Power Allowance

Building Area Method

- Floor area for each building area type x value for the area
- “area” defined as all contiguous spaces that accommodate or are associated with a single building area type as per the table
- When used for an entire building, each building area type to be treated as a separate area

Building Area Type	LPD (w/ft)
Automotive Facility	0.71
Convention Center	0.76
Courthouse	0.90
Dining: bar lounge/leisure	0.90
Dining: cafeteria/fast food	0.79
Dining: family	0.78
Dormitory	0.61
Exercise Center	0.65
Fire Station	0.53
Office	0.79

(Partial Table)

Interior Lighting Power Allowance

Space-by-Space Method

- Floor area of each space x value for the area
- Then sum the allowances for all the spaces
- Tradeoffs among spaces are allow

Common Space Types	LPD (w/ft2)
Locker Room	0.48
Lounge/Breakroom	
In a healthcare facility	0.78
Otherwise	0.62
Office	
Enclosed	0.93
Open Plan	0.81
Parking Area, Interior	0.14
Pharmacy Area	1.34

(Partial Table)

Additional Interior Lighting Power

Additional Interior Lighting Power Allowance = 1000 watts +

(Retail Area 1 x 0.45W/ft2)
(Retail Area 2 x 0.45W/ft2)
(Retail Area 3 x 1.05W/ft2)
(Retail Area 4 x 1.87W/ft2),

Where:

Retail Area 1 = the floor area for all products not listed in Retail Area 2, 3 or 4

Retail Area 2 = the floor area used for the sale of vehicles, sporting goods and small electronics

Retail Area 3 = the floor area used for the sale of furniture, clothing, cosmetics and artwork

Retail Area 4 = the floor area used for the sale of jewelry, crystal, and china.

Charlstonlights.com

Additional Interior Lighting Power

Add'l Interior Lighting Power Exceptions:

- Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is approved by the code official
- For spaces which lighting is specified to be installed in addition to general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power is < 0.9 W/ft2 in lobbies and < 0.75 W/ft2 in other spaces

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Proposed Connected Lighting Calculation

Total Proposed Lighting Power wattage must be calculated in accordance with Eq. 4-10

TCLP = [LVL + BLL + LED + TRK + OTHER]

- TCLP = total connected lighting power (watts)
- LVL = labeled wattage of luminaires connected directly to building power
- BLL = wattage of the ballast or transformer
- LED = wattage of LEDs with either integral or remote drivers
- TRK = wattage of lighting tracks, cable conductors, rail conductors, and plug-in busways specified wattage of the luminaires but not less than 8 W per linear foot OR the wattage limit of other permanent current-limiting devices on the system OR wattage limit of the transformer
- OTHER = the wattage of all other luminaires and lighting sources not covered previously and associated with interior lighting verified by data supplied by the manufacturer or other approved sources

Home Depot

Sum the wattage of all proposed connected lighting power

- This must include all lighting that is part of the design for the space including:
  - Overhead lighting
  - Task lighting
  - Decorative lighting
- Compare values; Proposed Wattage must be less than or equal to Allowed Wattage

Proposed Connected Lighting Calculation

Exceptions:

- Television broadcast lighting for playing areas in sports arenas
- Emergency lighting automatically off during normal business operation
- Lighting for occupants with special needs (visual impairment and other medical and age-related issues)
- Casino gaming areas
- Mirror lighting in dressing rooms
- Task lighting for medical and dental purposes (in addition to general lighting and controlled independently)
- Display lighting for exhibits in galleries, museums and monuments (in addition to general lighting and controlled independently)
- Theatrical, stage, film, and video production
- Used for photographic processes
- Integral to equipment or instrumentation installed by manufacturer
- Plant growth or maintenance
- Advertising or directional signage
- Food warming
- Lighting equipment that is for sale
- Lighting demonstration equipment in lighting education facilities
- Approved because of safety considerations
- In retail display windows when the display is enclosed by ceiling-height partitions
- Furniture-mounted supplemental task lighting controlled by automatic shutoff
- Exit signs

Questions

Lighting Controls

Lighting systems required to be provided with controls as specified for:

- Occupant Sensor Controls
- Time-Switch Controls
- Daylight-Responsive Controls
- Specific Application Controls
- Manual Controls
- Exterior Lighting Controls

Occupancy Sensors are required in:

- Classrooms/lecture/training rooms
- Conference/meeting/multipurpose rooms
- Copy/print rooms
- Lounges/breakrooms
- Enclosed offices
- Open plan office areas
- Restrooms
- Storage rooms
- Locker rooms
- Other spaces < 300 ft2 enclosed by floor-to-ceiling height partitions
- Warehouse storage areas

Occupancy Sensor Controls

Occupancy sensor function (other than for warehouses):

- Automatically turn lights off within 20 minutes after occupants have left space
- Either manual-on or controlled to automatically turn on lighting to not more than 50% power

  Exemptions: Full auto-on controls allowed in:
  - Public corridors
  - Stairways
  - Restrooms
  - Primary building entrance areas and lobbies
  - Areas where manual-on operation would endanger safety or security of room or occupants
- Incorporate a manual control to allow occupants to turn off lights

Occupancy Sensor Controls

In Warehouses

- Aisleways and Open Areas
  - Automatically reduce lighting power by > 50% when areas are unoccupied
  - Control lighting in each aisleway independently
  - Not control lighting beyond the aisleway being controlled by the sensor

In Open Plan Office Areas

- Spaces less than 300 ft2 to comply with previously described Occupant Sensor Control Functions

In all other In Open Plan Office Areas spaces :

- General lighting controlled separately in zones with floor areas not greater than 600 ft2
- Automatically turn off general lighting in all control zones within 20 minutes after occupants have left
- General lighting power in each control zone reduced by not less than 80% of full zone general lighting power, in reasonable uniform illumination pattern within 20 minutes of all occupants leaving
  - Control functions that switch control zone lights completely off when zone is vacant meet this requirement
- Any daylight responsive control to active general lighting or control zone general lighting only when occupancy for the same area is detected

Time-Switch Controls

Each area of the building that is NOT provided with occupant sensor control must have a time-switch control to turn lights off automatically.

Exceptions: where a manual control can provide the light reduction and time-switch control is not required:

- Spaces where patient care is directly provided
- Spaces where an automatic shutoff would endanger occupant safety or security
- Lighting intended for continuous operation
- Shop and laboratory classrooms

Time-Switch Control Functions must include:

- Minimum 7-day clock; capable of being set for 7 different day types/week
- Incorporate holiday “shutoff” feature to turn all controlled lighting loads for ≥ 24 hours and resume to normally scheduled operations
- Program backup capabilities to prevent loss of program and time setting for ≥ 10 hours if power is interrupted
- Override switch should include:
  - Manual control
  - Control lighting to remain on for <2 hours
  - Control lighting for an area < 5,000 ft2

Time-Switch Control Exemptions and Functions

Exceptions:

- Mall Concourses
- Auditoriums
- Sales Areas
- Manufacturing Facilities
- Sports Arenas

Modified Functions for Exemptions:

- Time limit permitted to be > 2 hours provided switch is a captive key device
- Override switch not limited to an area 5,000 ft2 provided area is < 20,000 ft2

- If area has a manual control the following areas are not required to have light reduction controls:
  - spaces with 1 luminaire with rated power < 100 watts
  - spaces that use < 0.6 watts/ft2
  - corridors, lobbies, electrical rooms and or mechanical rooms

Light-Reduction Controls and Options

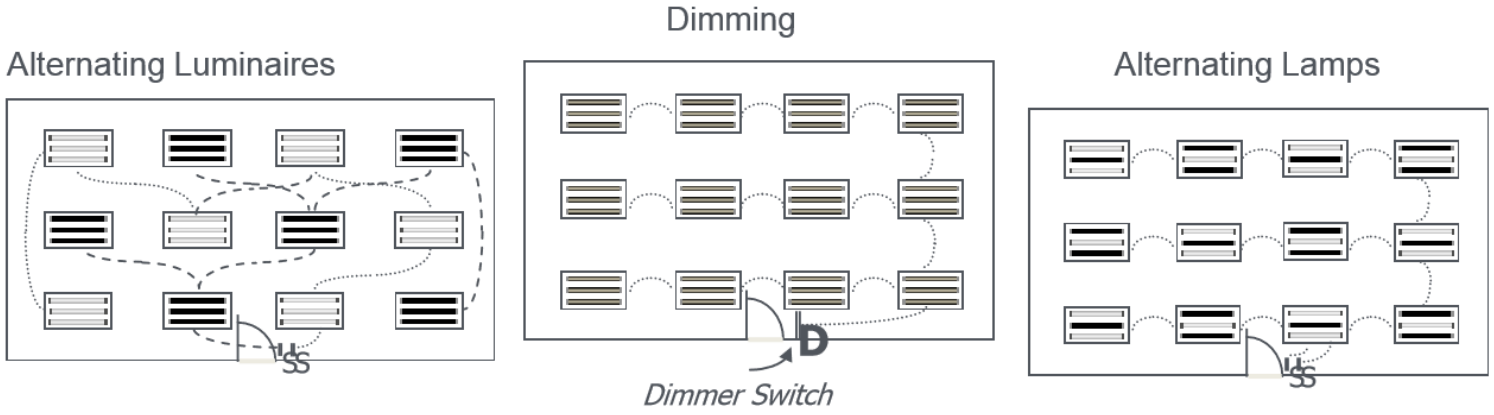
Light Reduction Controls must allow the occupant to reduce connected lighting load

- By not less than 50%
- In a reasonably uniform illumination pattern

Light Reduction Control Not required in daylight zones with daylight responsive controls complying with C405.2.3

Reduction Control Options:

- Controlling all lamps or luminaires
- Dual switching of alternate rows of luminaires, alternate luminaires or lamps
- Switching middle lamp luminaires independently from the outer lamps
- Switching each luminaire or each lamp



Daylight Responsive Controls

Daylight Responsive Controls are required to control lighting in daylight zones where there is greater than 150 watts of general lighting within:

- Sidelit zones
- Toplit zones

Exceptions:

- Health care facilities where patient care is directly provided
- Lighting required for specific application control
- Sidelight daylight zones on 1st floor above grade in Group A-2 and Group M occupancies
- New buildings where the
  - TCLP = [LVL + BLL + LED + TRK + OTHER]

  is less than the adjusted Lighting Power Allowance
  - $LPA_{Adj} = LPA_{norm} \times (1.0 - 0.4 \times UDZFA/TBFA)$

  Uncontrolled Daylight Zone Floor Area

  Total Building Floor Area

- Toplit zones shall be controlled independently of lights in sidelit zones
- Controls shall be configured so that they can be calibrated from within the space by authorized personnel
- Calibration mechanisms shall be in a location with ready access
- In offices, classrooms, laboratories, and library reading rooms, controls shall dim lights continuously from full light output to 15% of full output
- Configured to completely shut off all controlled lights
- Sidelit zones facing different cardinal orientations (within 45 degrees of due north, east, south, west) controlled independently of each other

Exception:

- Up to 150 watts in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation

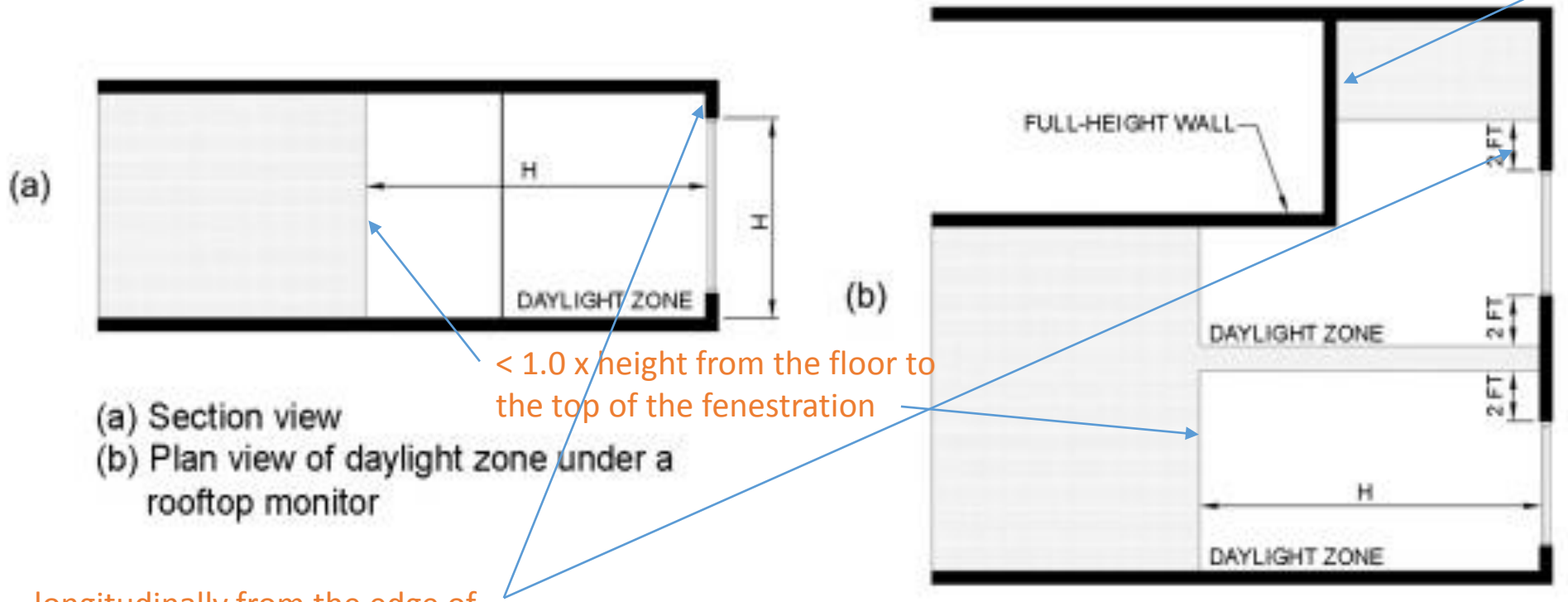
Daylight Zones – Sidelit Zones

Definition: Floor area adjacent to vertical fenestration that complies with ***all*** of the following:

- Fenestration located in a wall:
  - Sidelit zone shall extend laterally to the nearest full-height wall OR
  - < 1.0 x height from the floor to the top of the fenestration, and longitudinally from the edge of the fenestration to the nearest fullheight wall, or up to 2 ft., whichever is less
- Area of fenestration > 24 ft^2
- Distance from fenestration to any building or geological information that would block access to daylight is > than the height from bottom of fenestration to top of building or geologic information
- The visible transmittance of fenestration > 0.20

Daylight Zones – Sidelit Zones

Sidelit zone shall extend laterally to the nearest full-height wall



(a) Section view
(b) Plan view of daylight zone under a rooftop monitor

< 1.0 x height from the floor to the top of the fenestration

longitudinally from the edge of the fenestration to the nearest fullheight wall, or up to 2 ft., whichever is less

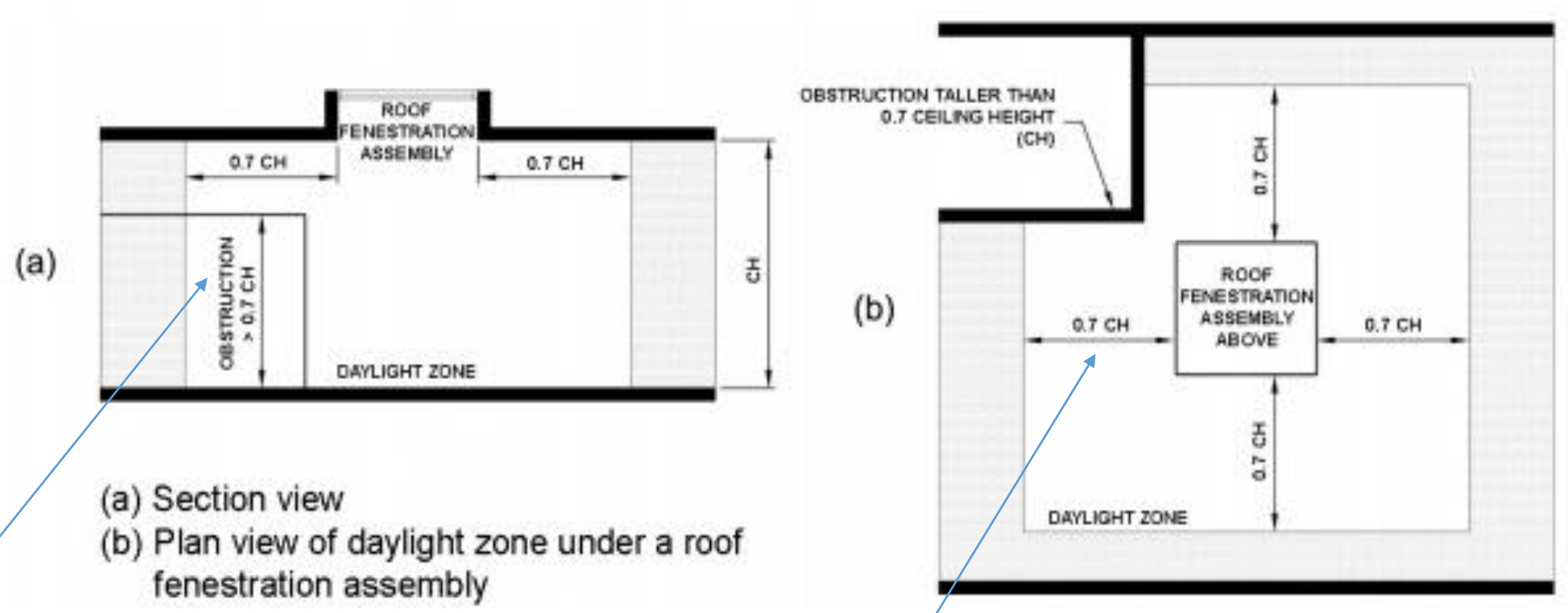
FIGURE C405.2.3.2
SIDELIT ZONE

Daylight Zones – Toplit Zones

Definition: The floor area underneath a roof fenestration assembly that complies with ***all*** of the following:

- Zone shall extend laterally and longitudinally beyond the edge of the roof fenestration assembly to the nearest obstruction that is (taller) > 0.7 x the ceiling height, > 0.7 x the ceiling height, whichever is less
- Where located in rooftop monitor, toplit zone to extend laterally to nearest obstruction taller than 0.7 x the ceiling height, or up to 1.0 times the height from floor to bottom of fenestration, whichever is less, and longitudinally from the edge of the fenestration to the nearest obstruction taller than 0.7 x ceiling height, or up to 0.25 times the height from the floor to bottom of fenestration, whichever is less
- No building or geological formation blocks different sunlight from hitting the roof fenestration assembly at the peak solar angle on the summer solstice
- Where located in existing buildings, visible transmittance of the roof fenestration assembly times the area of the rough opening of the roof fenestration assembly divided by area of daylight zone > 0.008

Daylight Zones – Toplit Zones



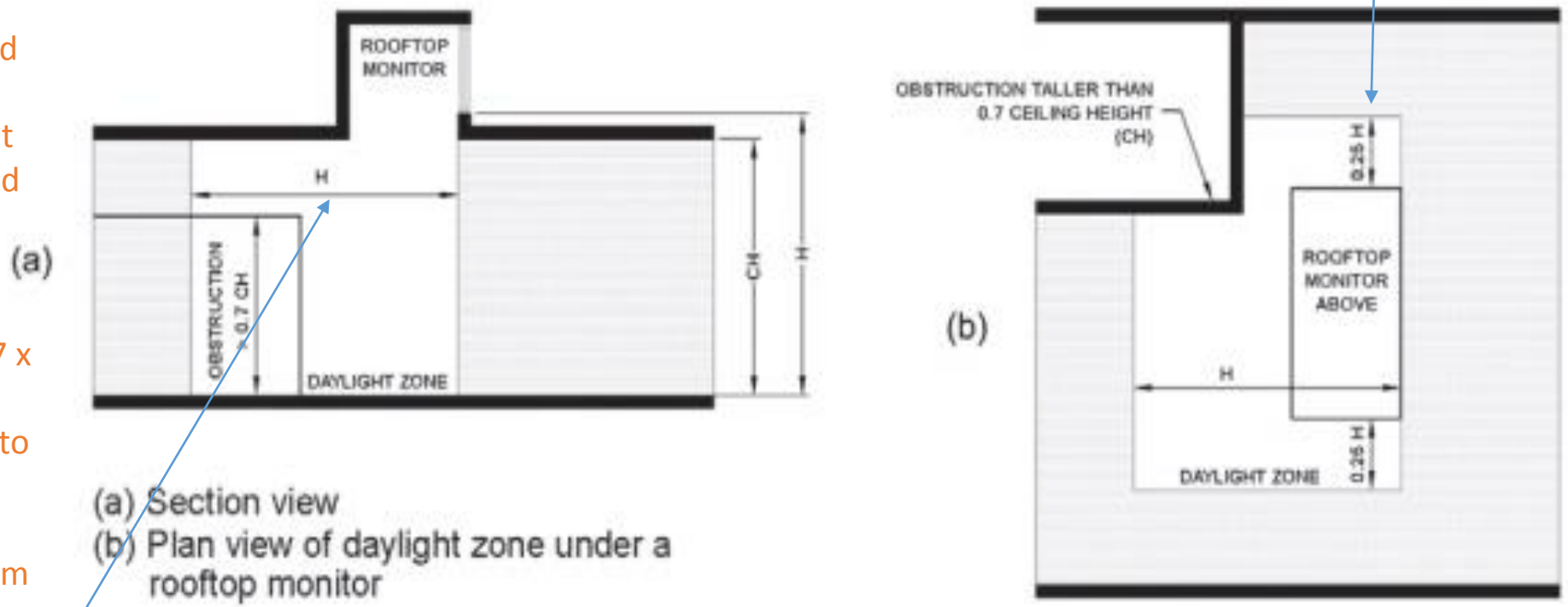
(a) Section view
(b) Plan view of daylight zone under a roof fenestration assembly

Zone shall extend laterally and longitudinally beyond the edge of the roof fenestration assembly to the nearest obstruction that is (taller) > 0.7 x the ceiling height, > 0.7 x the ceiling height, whichever is less

Daylight Zones – Toplit Zones

And longitudinally from the edge of the fenestration to the nearest obstruction taller than 0.7 x ceiling height, or up to 0.25 times the height from the floor to bottom of fenestration, whichever is less

Where located in rooftop monitor, toplit zone to extend laterally to nearest obstruction taller than 0.7 x the ceiling height, or up to 1.0 times the height from floor to bottom of fenestration, whichever is less



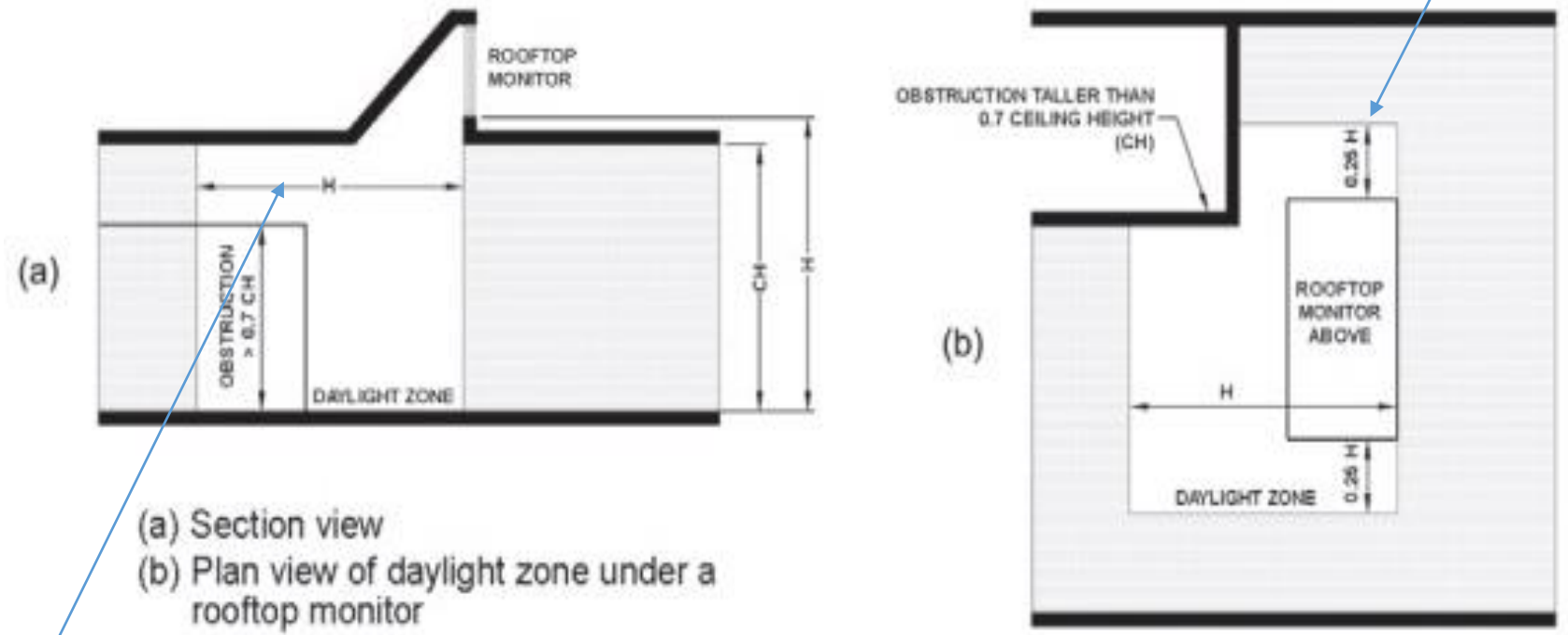
(a) Section view
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2.3.3(2)
DAYLIGHT ZONE UNDER A ROOFTOP MONITOR

Daylight Zones – Toplit Zones

And longitudinally from the edge of the fenestration to the nearest obstruction taller than 0.7 x ceiling height, or up to 0.25 times the height from the floor to bottom of fenestration, whichever is less

Where located in rooftop monitor, toplit zone to extend laterally to nearest obstruction taller than 0.7 x the ceiling height, or up to 1.0 times the height from floor to bottom of fenestration, whichever is less



(a) Section view
(b) Plan view of daylight zone under a rooftop monitor

FIGURE C405.2.3.3(3)
DAYLIGHT ZONE UNDER A SLOPED ROOFTOP MONITOR

Manual Controls

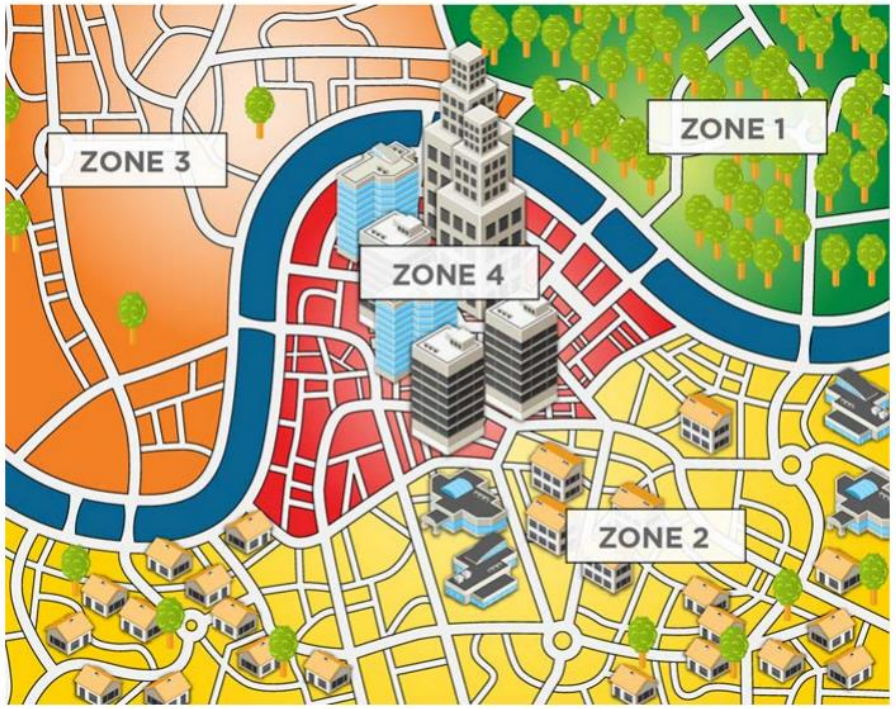
In a location where:

- occupants have ready access
- controlled lights are visible (or identify the area served by the lights and indicate status)

Questions

Exterior Lighting Zones

Power allowances are listed by lighting zones:



Lighting Zone	Description
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas
3	All other areas not classified as lighting zone 1, 2 or 4
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

Exterior Lighting Zones

		Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance		350 W	400 W	500 W	900 W
	Uncovered Parking Areas				
	Parking areas and drives	0.03 W/ft2	0.04W/ft2	0.06 W/ft2	0.08 W/ft2
	Building Grounds				
	Walkways and ramps less than 10 feet wide	0.5 W/lin. foot	0.5 W/lin. foot	0.6 W/lin. foot	0.7 W/lin. foot
	Walkways and ramps 10 feet wide or greater Plaza Areas Special Feature Areas	0.10 W/ft2	0.10 W/ft2	0.11 W/ft2	0.14 W/ft2

(Partial Table)

Exterior Lighting Zones

	Zone 1	Zone 2	Zone 3	Zone 4
Building Facades	No Allowance	0.075 W/ft2of gross above-grade wall area	0.113 W/ft2of gross above-grade wall area	0.15 W/ft2of gross above-grade wall area
Automated teller machines (ATM) and night depositories	135 W per location plus 45 W per additional ATM per location			
Uncovered entrances and gatehouse inspection stations at guarded facilities	0.5 W/ft2of area			
Uncovered loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.35 W/ft2of area			
Drive-up window and doors	200 W per drive-through			
Parking near 24-hour retail entrances	400 W per main entry			

Exterior Lighting and Building Lighting Power

Total Exterior connected Lighting Power to be the maximum rated wattage of all lighting powered through the energy service to the building

Exception: approved because of safety considerations

Connected Exterior Lighting Power must not exceed Exterior Lighting Power Allowance except where approved because of historical, safety, signage or emergency considerations:

1. Calculate exterior lighting power allowance
   - Lighting power densities by exterior function and by applicable lighting zone
2. Calculate proposed connected lighting power
   - Wattage calculation “rules”
   - Exempted lighting
3. Compare values: proposed wattage must be less than or equal to allowed wattage

Exterior Lighting and Building Lighting Powers

The following lighting does not need to be included in the proposed lighting calculation:

- Emergency lighting automatically off during normal business operation
- Exit signs
- Specialized signal, directional, and marker lighting associated with transportation
- Advertising signage or directional signage
- Lighting integral to equipment or instrumentation and installed by its manufacturer
- Lighting for theatrical purposes, including performance, stage, film production, and video production
- Lighting for athletic playing areas
- Temporary lighting
- Lighting for industrial production, material handling, transportation sites, and associated storage areas
- Theme elements in theme/amusement parks
- Lighting used to highlight features of art, public monuments, and the national flag
- Lighting used for water features and swimming pools
- Lighting controlled from within dwelling units and complying with R404.1

Exterior Lighting Control Requirements

- Exterior lighting systems provided with controls meeting daylight, setback and time-switch controls
- Decorative exterior lighting systems comply with controls meeting daylight, decorative and time-switch controls

Exceptions: Covered vehicle entrances or exits from buildings and parking structures where required for safety, security or eye adaptation; and lighting controlled from within dwelling units

Daylight Shutoff Required

- Lighting to be automatically off if sufficient daylight is present satisfying needs in the space

Grainger

Lowes

Exterior Lighting Control Requirements

Lighting Setback

- Building façade or landscape (non-decorative lighting) shall have controls configured to automatically reduce connected lighting power not less than 30% by selectively switching off or dimming luminaires at one of the following times:
  - no later than midnight to not earlier than 6 am
  - from not later than 1 hour after business closing to not earlier than 1 hour before opening
  - any period where activity has not been detected for at least 15 minutes

Decorative Lighting Shutoff

- Lighting for building façade and landscape automatically off from not later than 1 hour after business closing to not earlier than 1 hour before opening

All time switch controls

- have a clock capable of being programmed for not fewer than 7 days
- capable of being set for 7 different day types per week
- incorporate automatic holiday setback feature
- be able to retain programming and the time setting during loss of power for a period of ≥ 10 hours

Add'l Lighting and Electrical Requirements

Dwelling Electrical Meters

- Separate metering required for each dwelling unit

Electric Motors

- Electric motors must meet minimum efficiency requirements of the Tables provided in the code when tested and rated in accordance with test procedure 10 CFR 431
- Efficiency to be verified through certification under an approved certification program or when program does not exist, ratings shall be supported by data furnished by motor manufacturer

Add'l Lighting and Electrical Requirements

Electrical Transformers

- Low-voltage dry-type distribution electric transformers must meet minimum efficiency requirements of the Tables provided in the code when tested and rated in accordance with test procedure 10 CFR 431
- Efficiency to be verified through certification under an approved certification program or when program does not exist, ratings shall be supported by data furnished by transformer manufacturer

Exceptions:

- If you meet EPAct 2005 exclusions based on 10 CFR 431
  - Special purpose applications
  - Not likely in general purpose applications
  - Have multiple voltage taps where highest tap is ≥ 20% more than lowest tap
- Some specific products are listed

Add'l Lighting and Electrical Requirements

Vertical & Horizontal Transportation System & Equipment

- The sum of lumens divided by the sum of the watts > 35 lumens/W (not including signal and displays)
- Ventilation fans without their own air-conditioning system shall not consume < 0.33 watts/cfm at the max. rated speed of the fan
- Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for > 15 minutes
- Must comply with ASME A17.1/CSA B44
- Automatic controls configured to reduce speed to minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers

Exception: Variable voltage drive systems that reduce operating voltage in response to light loading conditions is an alternative to reduced speed function

- Regenerative drive
  - Escalators designed for one-way down operation only or for reversible operation
    - Must have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when escalator is loaded with passengers with a combined weight > 750 pounds

Functional Testing of Lighting Controls

Prior to passing final inspection, registered design professional to provide evidence that lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working order per construction documents and manufacturer's installation instructions

Occupancy Sensor Controls

- Certify location and aiming per manufacturer recommendation
- Test all sensors if project ≤ 7
- If > 7 sensors, test for each unique combination of sensor type and space geometry
- Where multiples of each unique combination of sensor type and space geometry are provided > 10%, but in no case < 1 of each combination shall be tested unless the code official or design professional requires a higher percentage to be tested
- Where >30% of tested controls fail, all remaining identical combinations must be tested

- Verify the following:
  - Status indicator, verify correct operation
  - Lights turn off or down to permitted level within required time
  - Auto-on – lights turn on to permitted level when someone enters the space
  - Manual on – lights turn on only when manually activated
  - Lights aren't incorrectly turned on by movement in nearby areas or by HVAC operation

Functional Testing of Lighting Controls

Time-Switch Controls

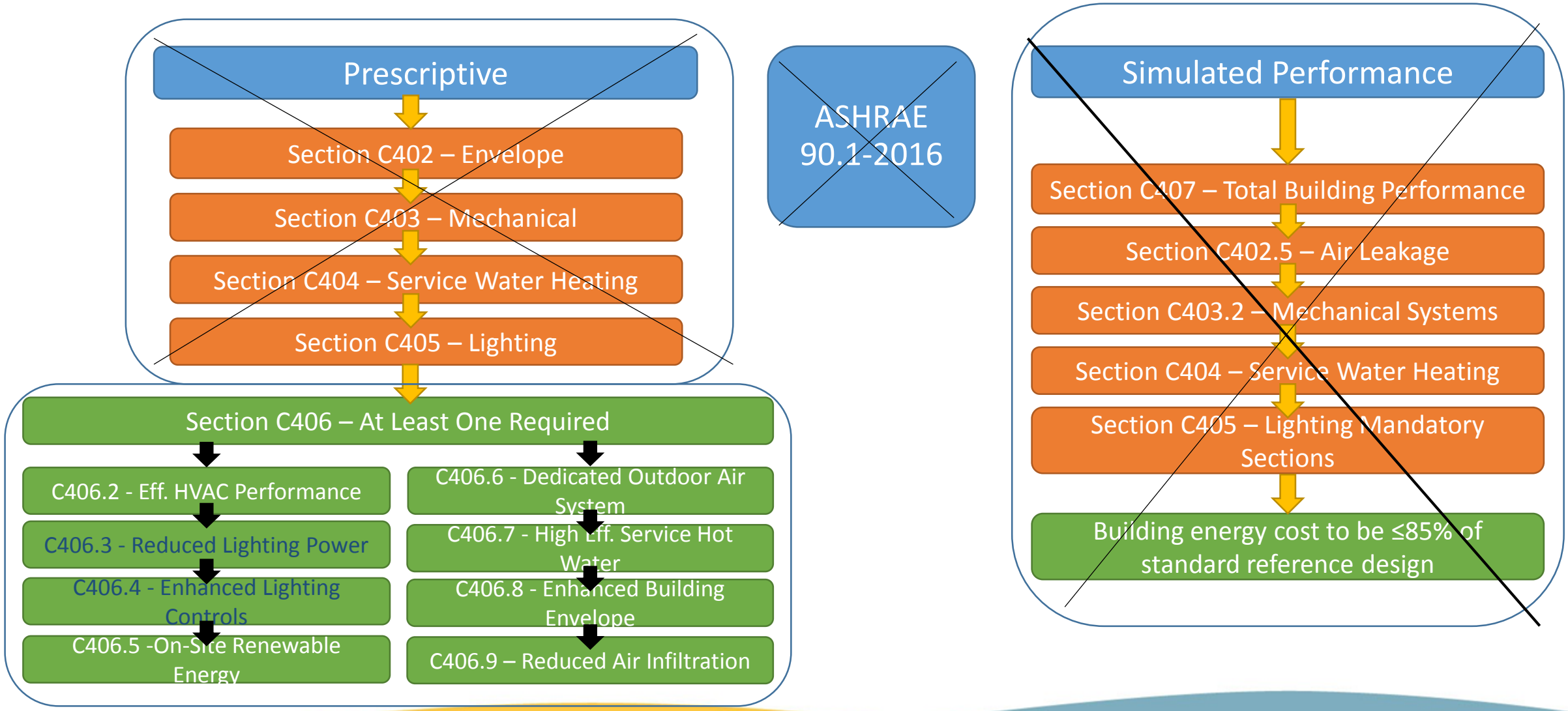
- Confirm programmed schedules
- Document schedules for owner
- Verify correct time and date are set
- Verify any battery backup is installed and energized
- Verify override time limit set to ≤ 2 hours
- Simulate occupied condition and verify and document:
  - Lights turn on and off with respective switches
  - Switch only operates lights in enclosed space where switch is located
- Simulate unoccupied condition and verify and document:
  - All nonexempt lights turn off
  - Manual override only operates lighting where it is located
- Additional testing as specified by the registered design professional

Daylight Responsive Controls

- Properly located, field-calibrated, and set to have appropriate setpoints and threshold light levels
- Daylight controlled lighting loads adjust to correct levels with available daylight
- Authorized personnel have ready access to calibration adjustment equipment

Construction documents specify that documents in this section be provided to building owner or owner's authorized agent within 90 days of date of receipt of certificate of occupancy

IECC Commercial Compliance Paths/Options



Additional Efficiency Package Options

Reduced lighting power density system

- Whole building LPD determined using 90% of values in Table C405.4.2(1) x floor area for the building types OR
- Using 90% by the space-by-space method in Section C405.4.2
- Determine total LPD of building using reduced whole building interior lighting power in Table 406.3 x floor area for the building types

Table C405.3.2(1)
Interior Lighting Power Allowances
Building Area Method

Building Area Type	2015 LPD	2018 LPD	% Change
Automotive facility	0.80	0.71	-11.3
Convention centre	1.01	0.76	-24.8
Courthouse	1.01	0.90	-10.9
Dining: bar lounge/leisure	1.01	0.90	-10.9
Dining: cafeteria/fast food	0.90	0.79	-12.2
Dining: family	0.95	0.78	-17.9
Dormitory	0.57	0.61	7.0
Exercise Centre	0.84	0.65	-22.6
Fire station	0.67	0.53	-20.9
Gymnasium	0.94	0.68	-27.7
Health care clinic	0.90	0.82	-8.9
Hospital	1.05	1.05	0.0
Hotel/Motel	0.87	0.75	-13.8
Library	1.19	0.78	-34.5
Manufacturing facility	1.17	0.90	-23.1
Motion picture theatre	0.76	0.83	9.2
Multifamily	0.51	0.68	33.3
Museum	1.02	1.06	3.9
Office	0.82	0.79	-3.7
Parking garage	0.21	0.15	-28.6
Penitentiary	0.81	0.75	-7.4

Additional Efficiency Package Options

Enhanced digital lighting controls located and operated in accordance with C405.2.2:

- Luminaires capable of:
  - continuous dimming,
  - being addressed individually OR a controlled group of ≤ 4 luminaires
- ≤ 8 luminaires controlled together in a daylight zone
- Fixtures controlled through digital control system that includes the following functions:
  - Control reconfiguration based on digital addressability
  - Load shedding
  - Individual user control of overhead general illumination in open offices
  - Occupancy sensors capable of being reconfigured through the digital control system
- Construction documents submitted including Sequence of Operations, Specs outlining each function of the fixture requirements above and complete functional testing of the controls

Contact Information and Questions

Lynn K. Chamberlin

Building Program Specialist

Nebraska Department of Environment and Energy

Lynn.chamberlin@Nebraska.gov

More Information can be found at:

www.iccsafe.org

- click on ‘Online Building Codes’ and select the code you wish to view.”